Airway control via the CobraPLA™ during percutaneous dilatational tracheotomy in five patients

[Le contrôle des voies aériennes par le CobraPLA™ pendant la trachéotomie dilatatrice percutanée chez cinq patients]

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Purpose: To evaluate the use of the new supraglottic airway device CobraPLA™ (CPLA) for performing percutaneous dilatational tracheotomy (PDT) utilizing continuous fibreoptic visualization of the larynx and trachea and uninterrupted airway control.

Clinical features: The percutaneous tracheotomies were carried out in five patients (four males and one female; mean age 72 yr, mean height 164.6 cm, mean weight 74 kg) following the Griggs technique under continuous fibreoptic vision and airway control provided by the CPLA. The mean time required for removal of the ETT, positioning of the CPLA, and confirmation of adequate ventilation and cuff seal was 78 sec. The mean time for the entire PDT procedure was six minutes and 57 sec. In one patient a 7-mm tracheostomy cannula was used, and in the other four patients an 8-mm cannula was used.

The hemodynamic and respiratory variables remained stable during the entire procedure; there were no adverse events.

At no point was there any significant difficulty in placing the CPLA or in providing ventilation or oxygenation. Each procedure could be observed easily in its entirety through the FOB.

Conclusions: This technique can be considered simple and safe because it is video-assisted and ensures a continuous airway control. The CPLA offers several advantages over some other supraglottic devices when performing this surgical procedure.

Objectif : *Évaluer la nouvelle canule oropharyngée supraglottique CobraPLA™ (CPLA) dans le cadre d'une trachéotomie dilatatrice percutanée (TDP) avec visualisation fibroscopique continue du larynx et de la trachée et contrôle ininterrompu des voies aériennes.*

Éléments cliniques : *Une trachéotomie percutanée a été réalisée chez cinq patients (quatre hommes et une femme d'âge moyen de 72 ans, de taille moyenne de 164,6 cm et de poids moyen de 74 kg) en suivant la technique de Griggs sous vision fibroscopique et contrôle des voies aériennes continus fournis par le CPLA. Le temps moyen nécessaire au retrait du TET, à la mise en place du CPLA et à la confirmation d'une ventilation suffisante et de l'étanchéité adéquate du ballonnet a été de 78 s. Le temps moyen d'une TDP complète a été de 6 min 57 s. Chez un patient, une canule à trachéotomie de 7 mm a été utilisée et chez les quatre autres, une canule de 8mm.*

Les variables hémodynamiques et respiratoires sont demeurées stables pendant toute l'intervention ; il n'y a pas eu d'événement indésirable. En aucun moment, il n'y a eu de difficulté significative de mise en place du CPLA ou de ventilation et d'oxygénation. Chaque opération était facile à observer dans son intégralité par le FOB.

Conclusion : *On peut considérer cette technique comme simple et sans danger, car elle est vidéo-assistée et permet un contrôle continu des voies aériennes. Le CPLA, utilisé en chirurgie, offre des avantages sur d'autres instruments supraglottiques.*

PERCUTANEOUS dilatational tracheotomy (PDT) is an attractive and safe alternative to conventional open tracheostomy. This technique has become more prevalent and widespread in the last several years because it carries fewer complications and is accomplished at a lower overall cost than traditional open surgical tracheostomies.[1]

Nevertheless, the blind technique of PDT carries with it some complications such as hemorrhage, *sc* emphysema and tube displacement. Most of these complications can be avoided by performing PDT under direct fibreoptic visualization and airway con-

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trol via an endotracheal tube (ETT),[2] Intubating Laryngeal Mask Airway (LMA),[3] LMA Classic,[4] or ProSeal Laryngeal Mask Airway[5,6] (The Laryngeal Mask Company Ltd., Maidenhead, Berkshire, UK) . To our knowledge, the use of any other supraglottic airway, besides those in the LMA class, during PDT has not yet been studied or reported.

The purpose of this study was to evaluate the use of the new supraglottic airway device CobraPLA™ (CPLA; Engineered Medical System, Indianapolis, IN, USA) rather than an ETT or LMA-class device to provide airway control during PDT and to allow continuous visualization of the tracheostomy site.

Clinical features

We enrolled five patients (four males and one female; mean age 72 yr, mean height 164.6 cm , mean weight 74 kg) in whom PDT was carried out for the purpose of avoiding complications which might result from an extended period of endotracheal intubation. Informed written consent for a Griggs-type 10 PDT was obtained from each patient.

The CPLA consists of a proximal breathing tube with an inflatable circumferential cuff and a standard 15 mm adapter. The softened distal end of the breathing channel (Cobra head) is widened and is designed to be positioned in the hypopharynx opposite the laryngeal inlet in order to divert the inspiratory gas into the trachea through the slotted distal openings. Our preliminary studies[7–9] showed that the CPLA could function as a successful supraglottic ventilatory device.

For each patient the procedure was carried out as follows: sedation was provided by an *iv* infusion of propofol, titrated to effect. After placing the patient on 100% oxygen, the indwelling ETT was removed and replaced with a CPLA, which was sized according to the patient's weight.[8] An adequate cuff seal was obtained and ventilation re-instituted at the previous settings for the patient. A fibreoptic bronchoscope (FOB) adapter was placed between the proximal end of the CPLA and the ventilator circuit and a FOB was advanced down to the distal end of the CPLA. The grill of the CPLA was identified and the FOB passed through it. The laryngeal inlet was easily viewed (in all patients) and the FOB was inserted through the vocal cords and advanced to the level of the second tracheal ring. An attendant constantly observed the surgical procedure through the FOB.

For the PDT, following sterile preparation the surgeon anesthetized the skin and *sc* tissues with a local anesthetic. A 1-cm vertical incision was made in the midline over the area of maximal trans-illumination, indicating the level of the second tracheal ring. The FOB was then withdrawn to a position just distal to the vocal cords in order to prevent damaging it during the remainder of the PDT. A needle was inserted into the trachea and its tip within the trachea was confirmed via the FOB view. Through the needle, a thin guide wire was advanced distally down the trachea, and then a single dilator passed over the wire. Finally, a tracheostomy tube was passed over the guide wire and the wire removed. Following confirmation of proper functioning of the tracheostomy tube the FOB and CPLA were removed.

Discussion

PDT has become increasingly popular over performing a traditional surgical tracheostomy in recent years because of its relative ease and low cost, as well as having fewer complications.[1,10,11] However, because it is a blind technique (from the surgeon's perspective) one must have assurance that the needle, guide wire, dilator, and tracheostomy tube all reside within the trachea. In the simplest form, aspiration through the needle advancing into the trachea indicates entry into that air-filled structure. However, subsequent steps of the procedure can still result in misplacement into soft tissue structures. Measuring end-tidal CO_2 can confirm placement of the tracheostomy tube, but it does not monitor the previous steps of the procedure (although it is possible to analyze CO_2 through the needle). Because of these limitations, continuous observation of the PDT via a FOB is used more and more frequently.[1]

This is the only technique that can assure successful completion of each stage of the PDT. In addition, one can monitor for excessive bleeding or perforation of the posterior wall of the trachea.

Given the potential problems when using an ETT to secure the airway during PDT, LMA-class devices are used during the procedure.[3–6] When using an ETT during PDT, the tube must be withdrawn partially in order to insert the cannula so that there is a risk of removing the ETT accidentally or rupturing the cuff. To our knowledge, there have been no reports discussing the use of any other supraglotic device other than LMAs for managing the airway during PDT.

The CPLA is a relatively new supraglottic airway which is available in eight sizes, allowing it to be used in infants weighing as little as 2.5 kg and in adults over 130 kg. It differs from LMA-class airways in that it has a circumferential cuff that resides in the hypopharynx at the base of the tongue as opposed to the LMA cuff, which lies immediately behind the cricoid cartilage (Figure).

The CPLA has been found to be easy to insert, with one series of 110 consecutive patients having this

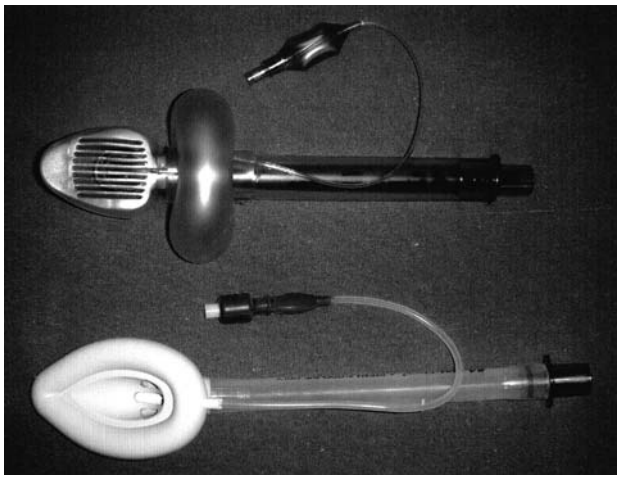

FIGURE CobraPLA™ and Laryngeal Mask Airway.

accomplished in 8 ± 2 sec.[8] It has been used successfully in both elective surgical cases[7–9] and has functioned well as a "rescue" airway.[9] There are three features of the CPLA which make it potentially advantageous over the use of the LMA-class devices for providing airway support for PDT. First, the CPLA provides a better cuff seal than does the LMA Classic,[8,12] and this might be important in patients receiving positive pressure ventilation. One limitation to the use of the CPLA (like other supraglottic devices), however, is to limit ventilation pressures so that insuflation of the stomach does not occur. Second, Gaitini[13] has shown that the fibreoptic view of the vocal cords through the distal end is better with the CPLA than with the LMA Classic. Third, the larger lumen of the size 4–6 CPLAs (which can easily accommodate a size 8 ETT) might make passage of a FOB easier.

We have shown that a CPLA is suitable as an alternative for either ETT or LMA-class devices when performing PDT in this series of five patients. The confirmation of potential advantages of the CPLA in this and other situations deserves further study.

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